Missouri Department of Natural Resources

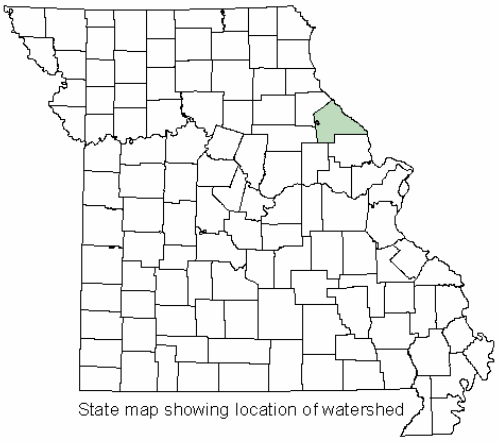
Total Maximum Daily Load Information Sheet

Vandalia Lake

(a.k.a. Vandalia City Reservoir, Weldon H. "Pete" Steiner Reservoir)

Waterbody Segment at a Glance:

County: Pike
Nearby Cities: Vandalia
Area of impairment: 37 surface acres
Pollutant: Atrazine
Source: Corn, Sorghum production


State map showing location of watershed

TMDL Priority Ranking: High

Description of the Problem

Beneficial Uses of Vandalia City Reservoir

- Livestock and wildlife watering
- Protection of aquatic life (Limited warm-water fishery)
- Human health protection (Fish consumption)
- Secondary contact recreation (Note: The former "Boating and canoeing" use was revised and renamed in the Missouri Water Quality Standards effective January 2006.)
- Drinking water supply

Use that is impaired

- Drinking Water Supply

Standards that apply

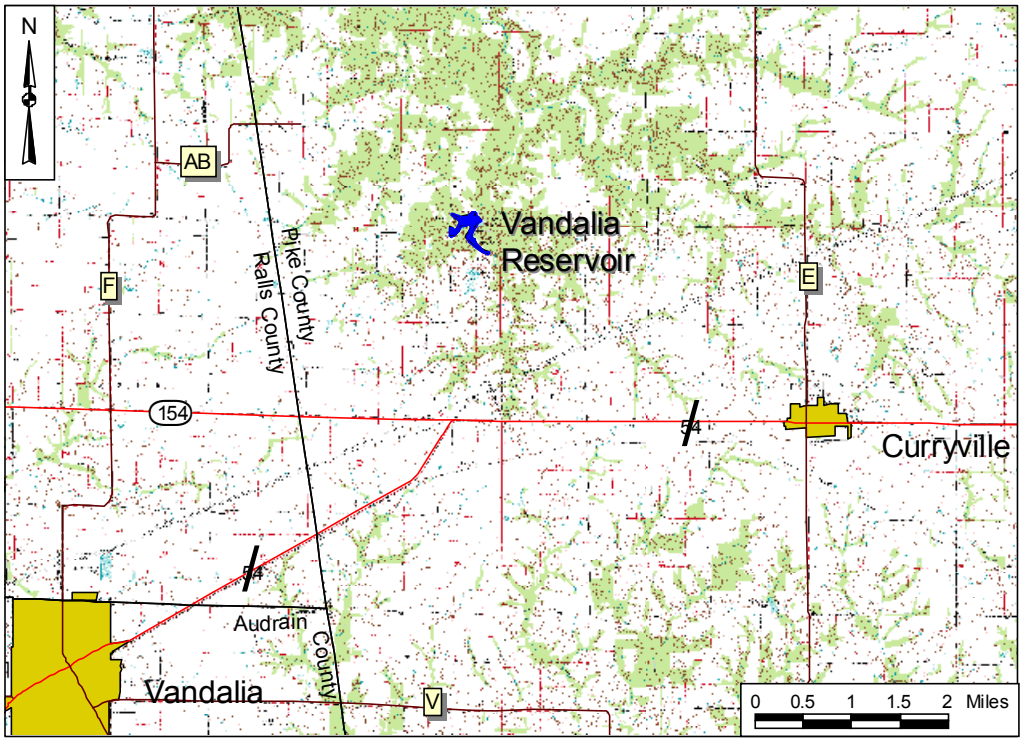
- Missouri's Water Quality Standards10 CSR 20-7.031, Table A., allows a maximum of 3 micrograms per liter (µg/L) atrazine. Because this number is based on health risk associated with a 70-year exposure period, the 3 µg/L is interpreted as a long-term average.

Background Information

Vandalia City Reservoir (also referred to as Vandalia Lake or Weldon H. "Pete" Steiner Reservoir) is located in Pike County, north of State Highway 54 between Vandalia and Curryville (See map). It was created by damming a tributary of South Spencer Creek (See watershed map at: www.dnr.mo.gov/env/wpp/watersheds/ws_pike.htm). It is a drinking water source for the town of Vandalia (in Audrain County) and surrounding dwellings. The reservoir

was renamed Weldon H. "Pete" Steiner Reservoir on January 9, 1979, after a respected former editor of the local newspaper, *The Vandalia Leader* (Vandalia Watershed Management Committee, 1999). However, the name has yet to be officially changed with the U.S. Geological Survey (USGS).

Vandalia City Reservoir in Pike County, Missouri



Atrazine is a systemic herbicide that blocks photosynthesis. It has been a major herbicide used for corn production since its introduction in 1958. Atrazine is the most heavily used herbicide in corn and grain sorghum production in Missouri where it provides selective broadleaf control and grass suppression at a lower cost than many other herbicides. Watershed vulnerability to agrichemical contamination is based on the chemistry of the contaminant, hydrology of a region and land-use. Streams draining watersheds with runoff-prone soils, such as those existing in the Vandalia City Reservoir watershed, may periodically contain high herbicide levels.

Atrazine was thought to be a Group C carcinogen (i.e., possibly caused cancer in humans) when the department first placed Vandalia City Reservoir on the 1998, and subsequently the 2002, 303(d) list of impaired waters. It was listed for atrazine contamination. However, in the October 2003 *Interim Reregistration Eligibility Decision* (EPA IRED, 2003), the U.S. Environmental Protection Agency (EPA) stated it had no clear indication that atrazine caused cancer in humans. Various studies have also been conducted to assess the effects of atrazine on amphibians, especially focusing on whether or not it was associated with endocrine disruption and thus reproduction. In the October 2003 IRED, EPA stated that the data available at that time was

insufficient to make a determination as to the potential for atrazine to impact reproduction in amphibians. EPA continues to review new studies on both issues as they become available.

Missouri is still using the 2002 303(d) list, where "drinking water supply" is identified as the designated beneficial use that is considered impaired. The "Drinking water supply" use is defined as follows:

> "Maintenance of a raw water supply which will yield potable water after treatment by public water treatment facilities."*
>
> *Water Quality Standards, 10 CSR 20-7.031(1)(C)10., Page 11.

The impairment of this lake is based on exceedence of the specific criterion for drinking water supply for atrazine (i.e., more than allowed), as listed in Missouri's Code of State Regulations at 10 CSR 20-7.031 (11/30/05), Table A- Criteria for Designated Uses, Pesticides. (Page 21. www.sos.mo.gov/adrules/csr/current/10Csr/10c20-7a.pdf). The standard is interpreted as the basis of a drinking water maximum contaminant limit (MCL) of 3 micrograms per liter (µg/L or parts per billion (ppb)) of active ingredient (ai) of atrazine.

The 3 µg/L criterion for atrazine in surface waters is the same as the criterion used for drinking water (i.e., processed or "finished" water). However, compliance with the drinking water standard is measured as a running annual average and the surface water standard in Table A is based on a 70-year mean. Although the department understands the desire for the TMDL to use the running annual average in its evaluation of trends, it is required to use a longer period to determine compliance with this particular standard. Therefore, the department must proceed with the TMDL based on the published standard (in Table A) for drinking water supply, which is 3 µg/L expressed as a 70-year mean. Because there is not a 70-year data set, the TMDL uses all of the data available since the last significant event (implementation of Best Management Practices in response to watershed committee efforts beginning in 1998) in order to most closely match the criterion in the water quality standards.

In 1997, the Vandalia Watershed Management Committee formed to address the concerns about atrazine levels in the City Reservoir. City officials, community residents, farmers and livestock producers, and University of Missouri Outreach and Extension, Soil and Water Conservation District, and various other agency personnel created an atrazine reduction plan, which was published in 1999 as the *Vandalia City Reservoir Water Resources Plan*. Committee goals were, and are, as follows:

- Reduce contaminant levels in the public water supply;
- Write a management plan that educates and improves communication, volunteerism and cooperation;
- Create stewardship opportunities;
- Ensure acceptable water treatment costs;
- Monitor water quality; and
- Maintain water supply below MCL limits.

In the spring of 2004, EPA and the registrants of pesticide products containing atrazine was signed into effect Memorandum of Agreement (MOA). The goal of the MOA, in relation to this

and other selected surface water bodies, was to reduce loading of atrazine and its chloro-metabolites to total chlorotriazine levels below their newly developed drinking water criteria. As part of the MOA, the EPA and the technical registrants have agreed to this drinking water performance standard. If these drinking water standards are not met, the use of atrazine may be excluded within the applicable watersheds.

As part of the MOA, the registrants have initiated a monitoring program on surface water for selected community water systems. The MOA provides details regarding conditions under which atrazine may continue to be used as a contingency to EPA approving the re-licensing registration of these products. It constitutes an incentive for atrazine manufacturers, distributors, and users to cooperate in order to protect the Vandalia City Reservoir's designated use as a drinking water supply lake.

The implementation of the Water Resources Management Plan, and subsequent adoption of Best Management Practices (BMPs) resulted in a dramatic reduction of atrazine levels in raw water. The adoption of voluntary BMPs is achieving successful results using economically and socially acceptable practices and is clearly a model for other atrazine-contaminated lakes in the state. Syngenta, in cooperation with the Missouri Corn Growers Association and other agencies, continues to work with producers in exploring employment of BMPs that could have a positive impact on water quality in the lake.

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176, Jefferson City, MO 65102-0176
Telephone: 1-800-361-4827 or (573) 751-1300 office
Facsimile: (573) 522-9920
Program Home Page: http://www.dnr.mo.gov/env/wpp/index.html